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Lessons learned from the design and implementation of nuclear liquid waste treatment installations –perspectives from a license holder and a service provider

Liquid waste is generated throughout the lifetime of any nuclear installations. To ensure minimal environmental impact, liquid waste management typically involves treatment steps where the volume of the radioactive waste is reduced, the physicochemical reactivity is stabilised, and the migration boundary is established. Initiatives of a new nuclear liquid waste treatment installation can originate from nuclear new build, from renewal of aged facilities, from new treatment needs (e.g., when shifting towards decommissioning stage), and from technical upgrade for a safer and more cost-efficient process. Fortum Power and Heat Oy (Fortum) is the license holder of Loviisa nuclear power plant (VVER-440, Finland), where the liquid waste treatment system renewal is currently underway. In addition to being an operator and license holder, Fortum is an active service provider that design and implements liquid waste treatment projects internationally. In this presentation, we share several key lessons learned from our recently completed and ongoing projects with a deep understanding across the system delivery boundary. A feasibility study based on strategy is an entry point for any design and implementation project. However, the focus of the feasibility study tends to be centred around finding a viable technical solution. Lesson learned #1 is that the emphases of the feasibility study shall be put on defining project lifecycles and boundary conditions, cost impact analysis which includes final disposal cost consequences, and technical feasibility with a wider range of solutions. When entering into the design and implementation phase, lesson learned #2 is that sufficient amount of resources are recommended to be reserved for piloting and design modifications. As the needs and boundary conditions are highly site-specific, optimising even a turn-key treatment solution might bring significant benefits. Open, customer-centric communications and project management is the #3 lessons learned, especially between the license holder organisation and the service provider organisation. Challenges are tackled together when the license holder's needs are concretely understood and overall waste routes taken into consideration in an early stage. The last lessons learned (#4) is that owner organisations are recommended to implement a holistic fleet level approach and to consider the deployment of mobile systems used in multiple sites over a longer period of time.

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